



Aakash

Medical | IIT-JEE | Foundations

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PREFACE

What is Knowledge Bytes ?

Knowledge Bytes is a collection of riddles, interesting facts, mnemonics, and puzzles that will make your learning fun and engaging.

We want you to be delighted about studying. Knowledge Bytes helps you to know more about the subject in a fun, motivating and educational way and helps to implement what you learn in a creative way.

Benefits



Saves Time



Develops Learning Skills



Stimulates Interest



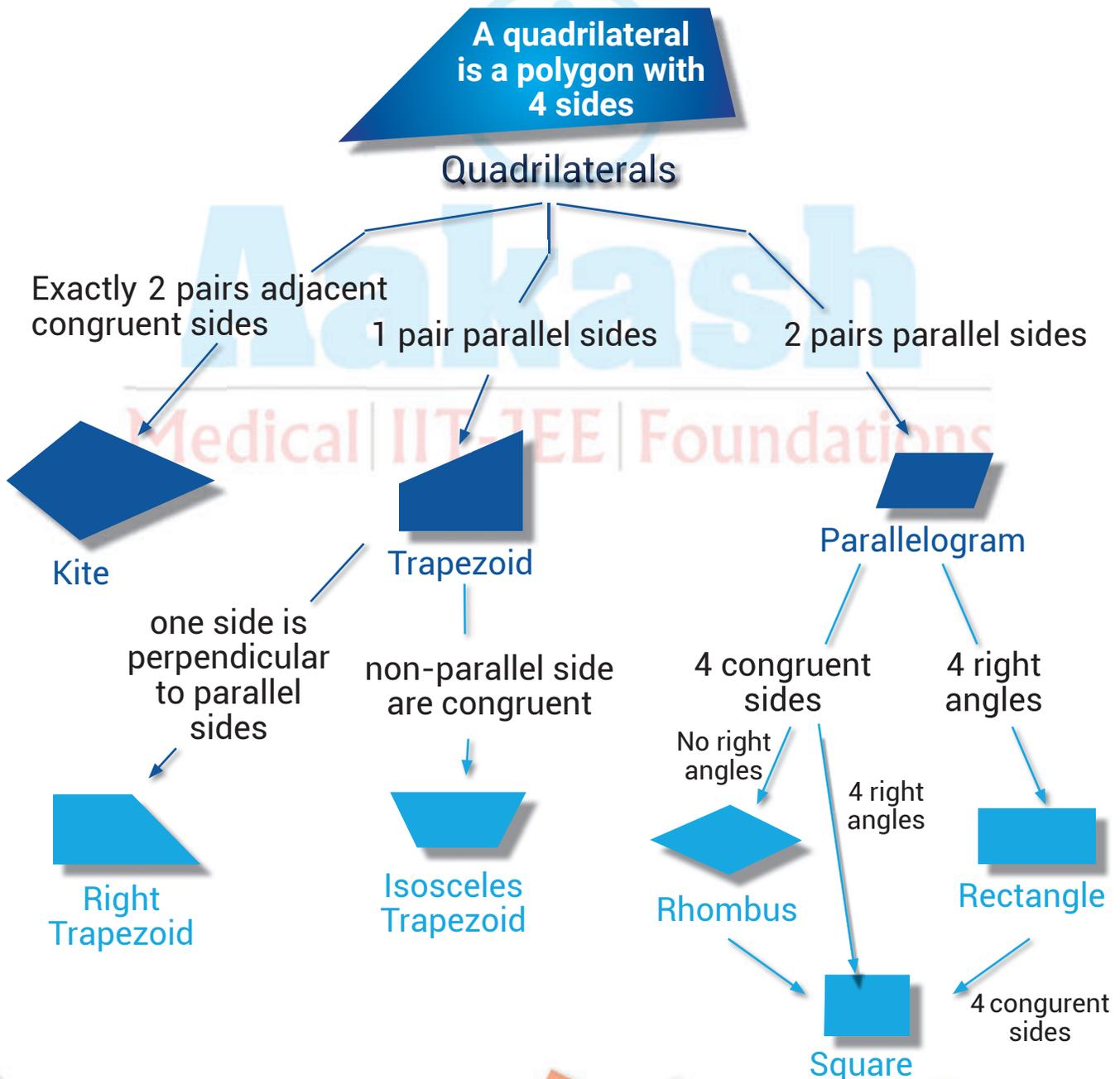
Leads to Increased Comprehension

EXPLORE

- | | |
|--------------------------------------|-------|
| 1. Understanding Quadrilaterals | 1-4 |
| 2. Friction | 5-9 |
| 3. Materials : Metals and Non-metals | 10-14 |
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Understanding Quadrilaterals

Quadrilateral Family Tree



Quadrilaterals and Their Properties

Property		Rectangle	Square	Parallelogram	Rhombus	Trapezium
Sides	All sides are equal	✗	✓	✗	✓	✗
	Opposite sides are equal	✓	✓	✓	✓	✗
	Opposite sides are parallel	✓	✓	✓	✓	only 1 pair of opposite sides are parallel
Angles	All interior angles are equal	✓	✓	✗	✗	✗
	Opposite angles are equal	✓	✓	✓	✓	✗
	Sum of any two adjacent angles is 180°	✓	✓	✓	✓	sum of only two pairs of adjacent angles is 180 degrees
Diagonals	Bisect each other	✓	✓	✓	✓	✗
	Bisect perpendicularly	✗	✓	✗	✓	✗
Formulas	Area	$l \times b$	a^2	$l \times h$	$\frac{1}{2} \times d_1 \times d_2$	$\frac{1}{2}$ (sum of parallel sides) height
	Perimeter	$2 \times (l + b)$	$4a$	$2 \times (l + b)$	$4a$	sum of all the sides

Quiz Time

Quiz - 1

Which one of the following is always a regular quadrilateral ?

- (a) Square (b) Trapezium (c) Kite (d) Rectangle

Quiz - 2

The perimeter of a parallelogram whose parallel sides have lengths equal to 12 cm and 7 cm is

- (a) 21 cm (b) 42 cm (c) 19 cm (d) 38 cm

Quiz - 3

Which of the following quadrilaterals have only two pairs of adjacent sides equal and its diagonals intersect at 90 degrees ?

- (a) Square (b) Kite (c) Rhombus (d) Rectangle

Quiz - 4

Which one of the following is not a quadrilateral ?

- (a) Square (b) Rectangle (c) Triangle (d) Parallelogram

Answer (Quiz Time)

Solution - 1

Ans. (a) : Square

Explanation : A square has all its sides equal and angles equal to 90 degrees.

Solution - 2

Ans. (d) : 38 cm

Explanation : Perimeter of parallelogram = 2 (sum of parallel sides)

$$P = 2 (12 + 7)$$

$$P = 2 (19)$$

$$P = 38 \text{ cm}$$

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Solution - 3

Ans. (b) : Kite

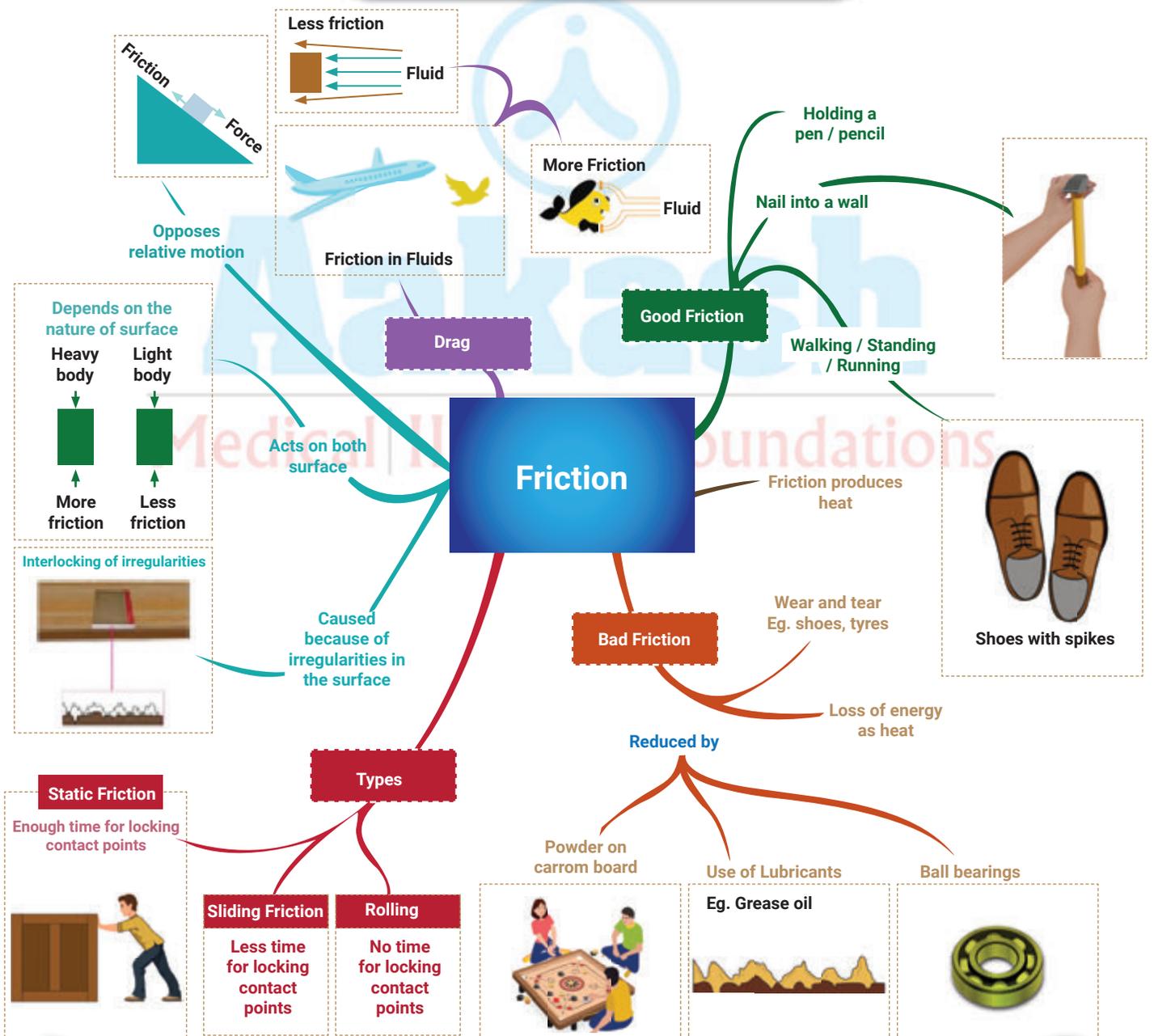
Solution - 4

Ans. (c) : Triangle

Explanation : A quadrilateral is a four-sided polygon but triangle is a three-sided polygon.

Friction

Mind Map on Friction



Examples of Friction You Never Think of

Brushing your teeth to remove particles

Sticky particles get stuck on our teeth and are very difficult to be removed. The brushing action allows us to overcome the **frictional force** of the particles and get them removed.

Ironing a shirt

Friction enables you to apply pressure on the wrinkled surface in order to iron. Without friction, the iron box would just slide through. The pressure we apply is a **factor affecting friction**. Friction is directly proportional to pressure.

Working of an eraser

The force of rubbing of an eraser overcomes the frictional force of the lead particles to remove them.

The belt holding your pants

The friction of the belt over your pant causes it to stay on your hips.

Glasses on your nose

Your glasses stay on your nose due to **static friction**.

Climber plants

The climber variety of plants climb onto surfaces easily due to frictional force. Generally, they use rough surfaces to climb like the bark of trees, etc.

Gecko lizard on a wall

The gecko lizard is able to climb onto surfaces vertically due to a very strong frictional force between its legs and the wall. It is said to use Van der Waal's forces for creating such a large frictional force.



Fun Facts

1

Liquid smooths out a surface, creating less friction. For example, it's harder for a car to stop on a wet road than a dry one because the water creates a barrier between the car and the road. The tyres don't have as much contact with the road.

Oil in a car engine lubricates the parts so they experience less friction. Friction causes heat, which can damage a car engine.

2

3

When one object rubs or slides against another, it slows down. The energy is changed from moving (kinetic) energy to heat energy. For example when you rub your hands together, your hands get warm.

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Vocabulary

Friction

The resistance that occurs when two objects move against each other.

Barrier

Something that prevents movement.

Lubrication

To apply an oily substance to reduce friction.



Quiz Time

- 1** Complete the sentence.
Friction always _____
- (a) Helps the relative motion (b) Opposes the relative motion
(c) Both (a) and (b) (d) None of these
- 2** Which one of these characteristics does a smooth surface has?
- (a) Less frictional force (b) More frictional force
(c) Sometimes less and sometimes more frictional force
(d) All of the above
- 3** Friction is a _____
- (a) Contact force (b) Non-contact force
(c) Magnetic force (d) None of these
- 4** Using lubricant between two surfaces
- (a) Can increase friction (b) Can decrease friction
(c) May increase or decrease friction (d) None of these
- 5** Fluid are _____
- (a) Gases only (b) Liquids only
(c) Both Gases and liquids (d) None of these



Joke on Friction



Quiz

① Which shoes have the least friction?

② What do you get when rubbing two oranges together?

Quiz Time

- | | | | |
|---|---------------------------------|---|---------------------------|
| 1 | (b) Opposes the relative motion | 2 | (a) Less frictional force |
| 3 | (a) Contact force | 4 | (b) Can decrease friction |
| 5 | (c) Both gases and liquids | | |

Answer (Joke on Friction)



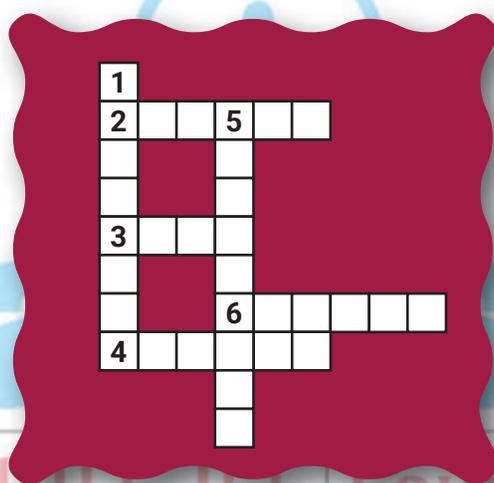
① Slippers

② Pulp friction



Materials : Metals and Non-metals

Crossword

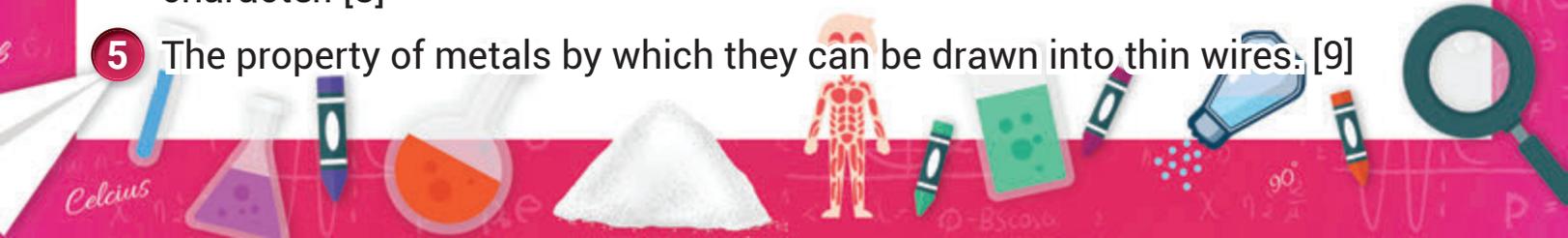


ACROSS

- 2 Compounds of metals/non-metals with oxygen. [6]
- 3 When iron articles are exposed to moist air for long time, they forms _____. [4]
- 4 The arrangement of metals on the basis of their decreasing reactivities is called activity _____. [6]
- 6 The property of metals due to which their surface shine. [6]

DOWN

- 1 Metals on hitting, produce ringing sound because they have _____ character. [8]
- 5 The property of metals by which they can be drawn into thin wires. [9]



Interesting Facts

1

The word metal comes from the Greek word 'metallon,' which means quarry or to mine or excavate.

2

Touching stainless steel will remove the odour of garlic and onion from your hands. Even stainless steel "soap" are sold in stores, which are just a bar of stainless steel to rub on your hands.

3

Pure aluminium, which is the most abundant metal in the Earth's crust, was once considered a precious metal worth more than gold, until cheaper methods for separating it out from ore were invented in the 1800s.

4

Research has proven that copper and its alloys, such as brass, have natural anti-microbial properties and can quickly kill viruses and bacteria. Hospitals and food service institutions use these metals (alloys) on frequently touched surfaces, such as door knobs, faucets, hand rails, etc., to help in preventing the spread of disease.

5

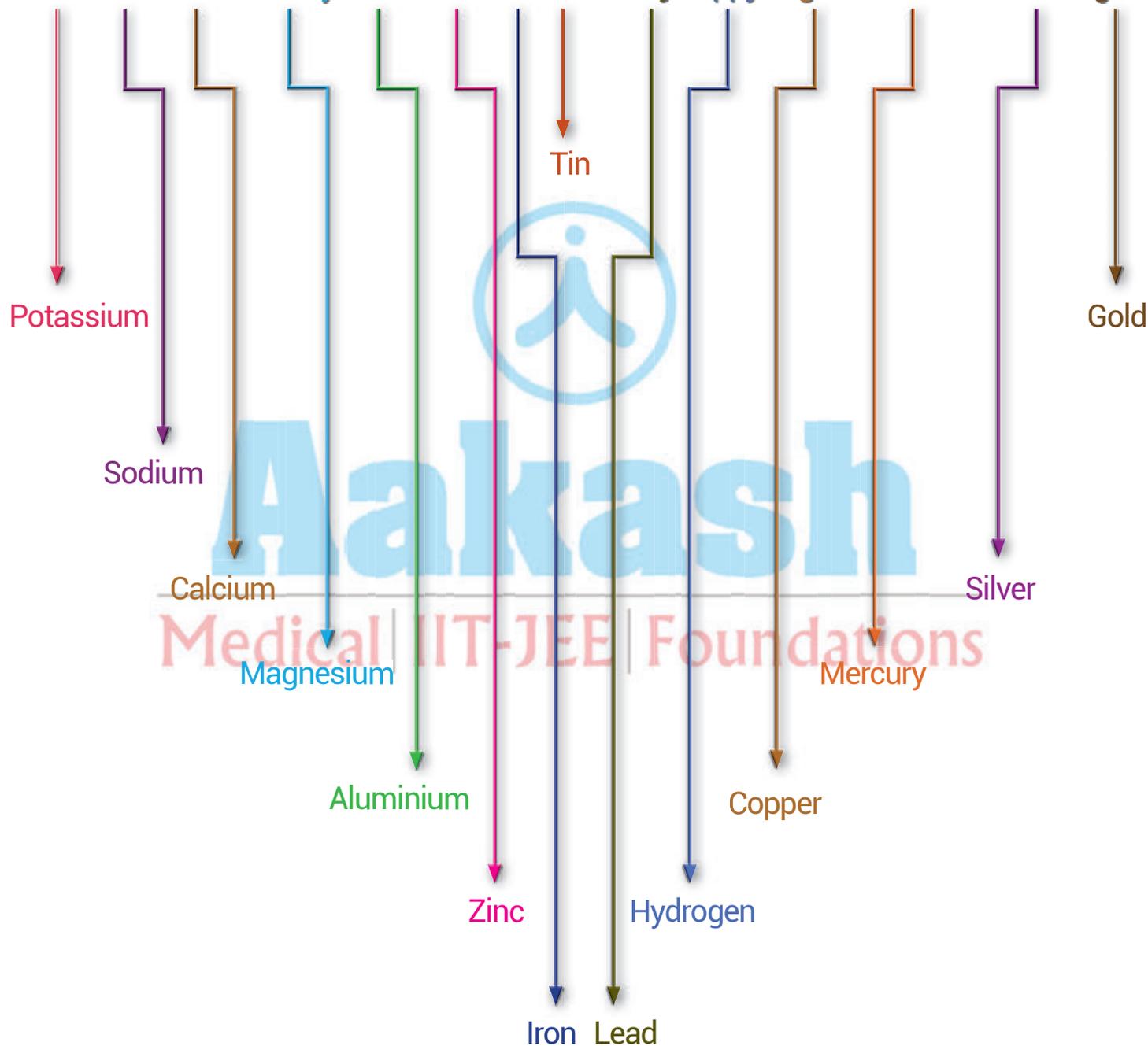
The tallest free-standing structures in the world are made of metals, primarily the alloy steel. They include the Dubai skyscraper Burj Khalifa, the Tokyo television tower Skytree and the Shanghai tower Skyscraper.

6

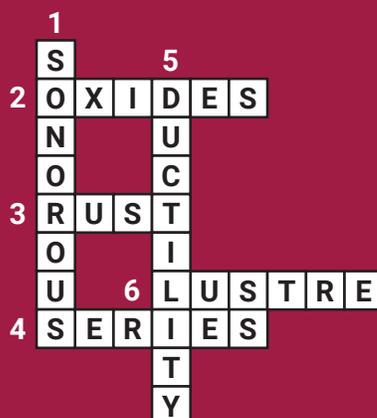
The Eiffel Tower grows six inches taller in the summer as compared to its height in winters because steel and iron expand when exposed to heat.

Mnemonics for the Reactivity Series

Please send cats monkeys and zebras in their lovely happy cages made of silver and gold



Answer (Crossword)



Answer (Quiz Time)

- | | | | |
|---|---------------------------|---|--------------|
| 1 | (c) Mercury | 2 | (a) ZnO |
| 3 | (a) Hydrated ferric oxide | 4 | (b) Platinum |
| 5 | (b) Allotropes | | |



Microorganisms : Friend and Foe

Interesting Facts

What is Caterpillar Fungus?



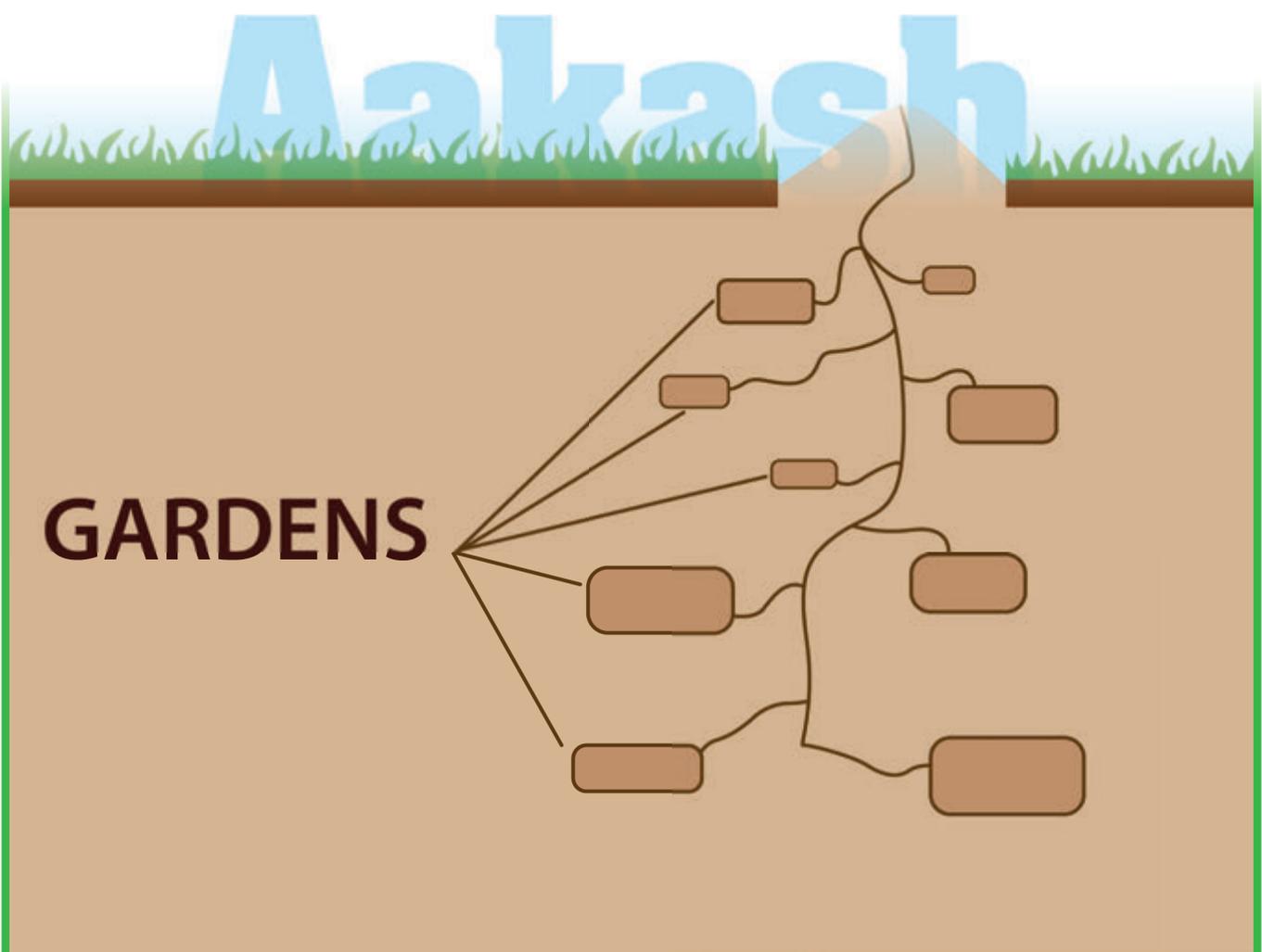
In the old days, Chinese people thought that the caterpillar fungus was nothing but worms. However, after years of study, it was found that actually it is a fruiting body, produced by the fungus, *Cordyceps sinensis*, on dead caterpillars of the moth *Hepilus fabricius*. Spores of *Cordyceps sinensis* grow inside the caterpillars filling the caterpillar with filaments (**hyphae**). When the caterpillar dies the fungus produces a stalked fruiting body that produces spores. The spores are spread in the wind to the next generation of caterpillars.

Today, the caterpillar fungus is mainly used as a tonic to increase strength or for rejuvenation, post long serious injury. They can also reduce stress. The caterpillar fungus is a traditional medicine that has been widely used as a tonic and/or medicine by the Chinese for hundreds of years.



What is an Ant Garden?

The leaf-cutting ants of Central and South America create their food supply by forming a mutually beneficial association with certain fungi. They grow these fungi on gardens created from piles of disks they have cut from living leaves. The ants cannot digest cellulose, (which is a complex molecule found in the cell walls of leaves), but the fungus can. By using cellulose as food for its own growth, the fungus converts the cellulose into simpler carbohydrates. The ants then eat the fungus. Thus, the fungus benefits from a guaranteed food supply. The ants house the beneficial fungus in their nests, supply it with leaves, and remove any invading fungi. Ant nest mounds extend up to three feet underground and nest building raises a huge mound of soil.



The organisms around us, whom we can barely see with our naked eye



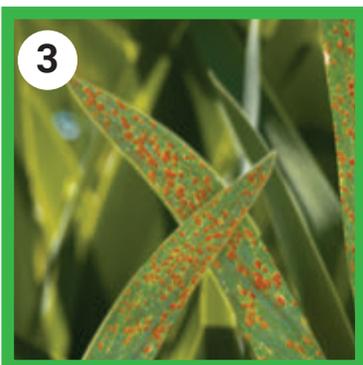
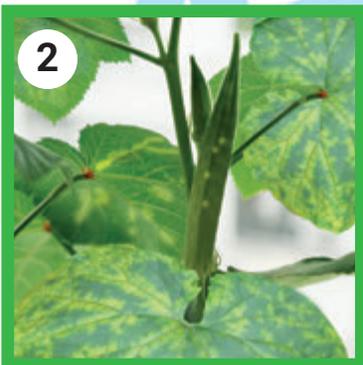
The part of the fungus visible to us is only the fruit of the organism. The living body of the fungus is a *mycelium*, which is made up of a web of tiny filaments known as *hyphae*. The *mycelium* is usually hidden in the wood, soil etc. These webs stay unseen until they develop mushrooms, puffballs or other fruiting bodies. If the *mycelium* produces microscopic fruiting bodies, people may never notice the fungus.

Most fungi's cell wall is made out of chitin. This is the same material as the hard outer shells of insects. Plants do not make chitin. Fungi feed by absorbing nutrients from the organic material in which they live. They do not have stomach. Hence, they must digest their food before it can pass through the cell wall into the hyphae. Hyphae secrete acids and digestive enzymes that break the surrounding organic material down into simple molecules which they can easily absorb. Fungi have evolved to use a lot of different items for food. Some are decomposers living on dead organic material like leaves. Some fungi cause diseases by using living organisms for food.

Like two different faces of the coin, fungi do not only have a harmful side, they are also used in preparing drugs (medicines) to cure diseases and stop the rejection of transplanted hearts and other organs.

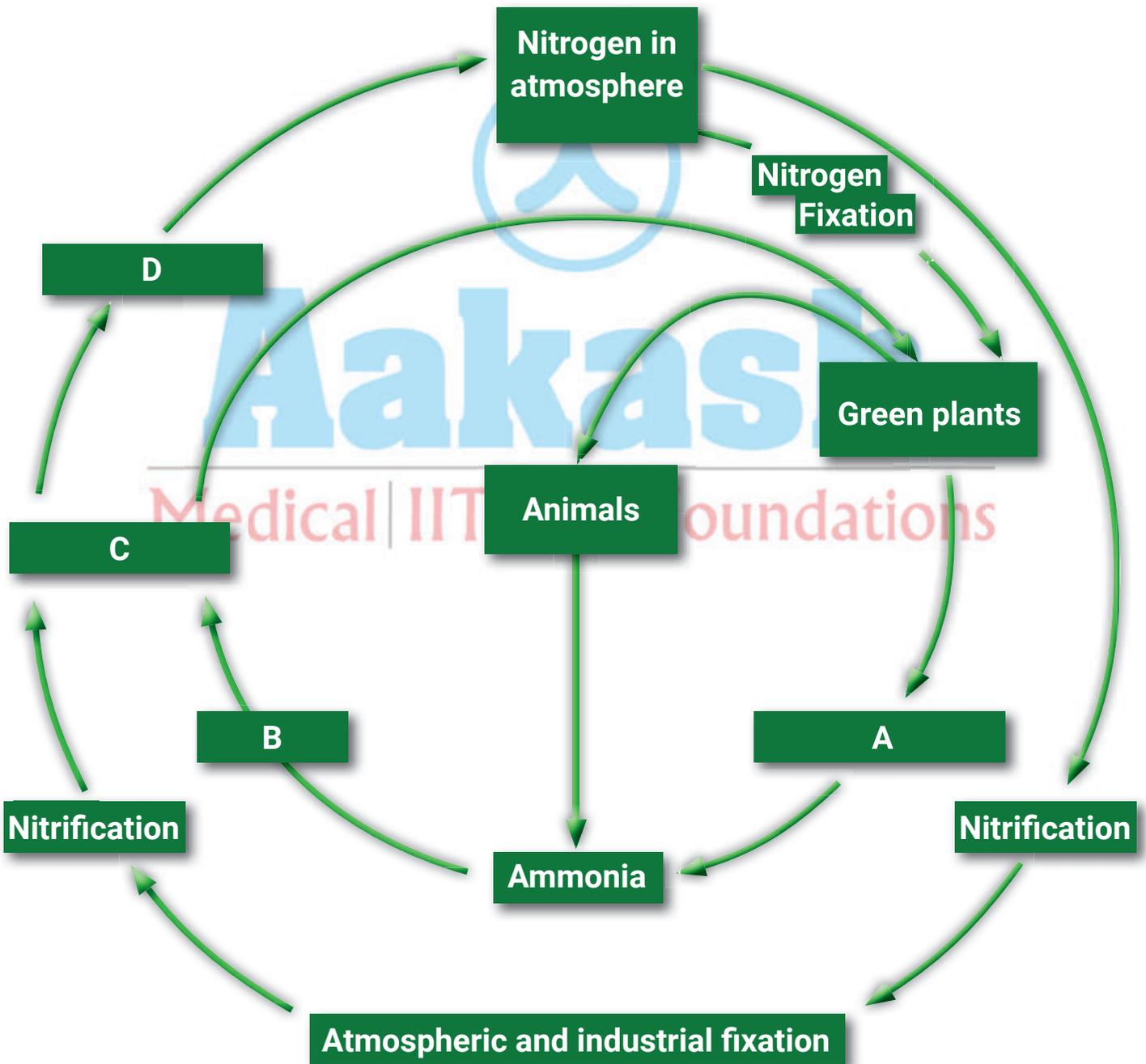


Match the following



Fill in the blanks

Find out A, B, C, D



Puzzle (Baffling Bugs)

In this puzzle you have to search for some of our friendly as well as some of our enemy microbes.

1 I'm a slipper-shaped organism, with hair like cilia all over my cell.

2 I am a rod-shaped bacterium, just like the one in your curd.

3 I can spoil your bread even within the packet, my spores can germinate anywhere I inhabit.

4 I am the comma-shaped bacterium, that can cause cholera.

5 I am not a plant but I can do photosynthesis, I am not an animal but I can be heterotrophic. I am a protozoan with long whip-like flagella, you can call me holozoic.

6 I am a unicellular fungus that can help you make your bread fluffy.

7 Using this process, a microbe can make wine from grapes.

8 I live in the root nodules of Peas & Grams; I can fix the nitrogen in the soil for these plants.

9 I am a virus that causes paralysis of lower body in infants. Two drops of oral vaccine can save you from me, if only you listen to Amitabh Bachchan ji.

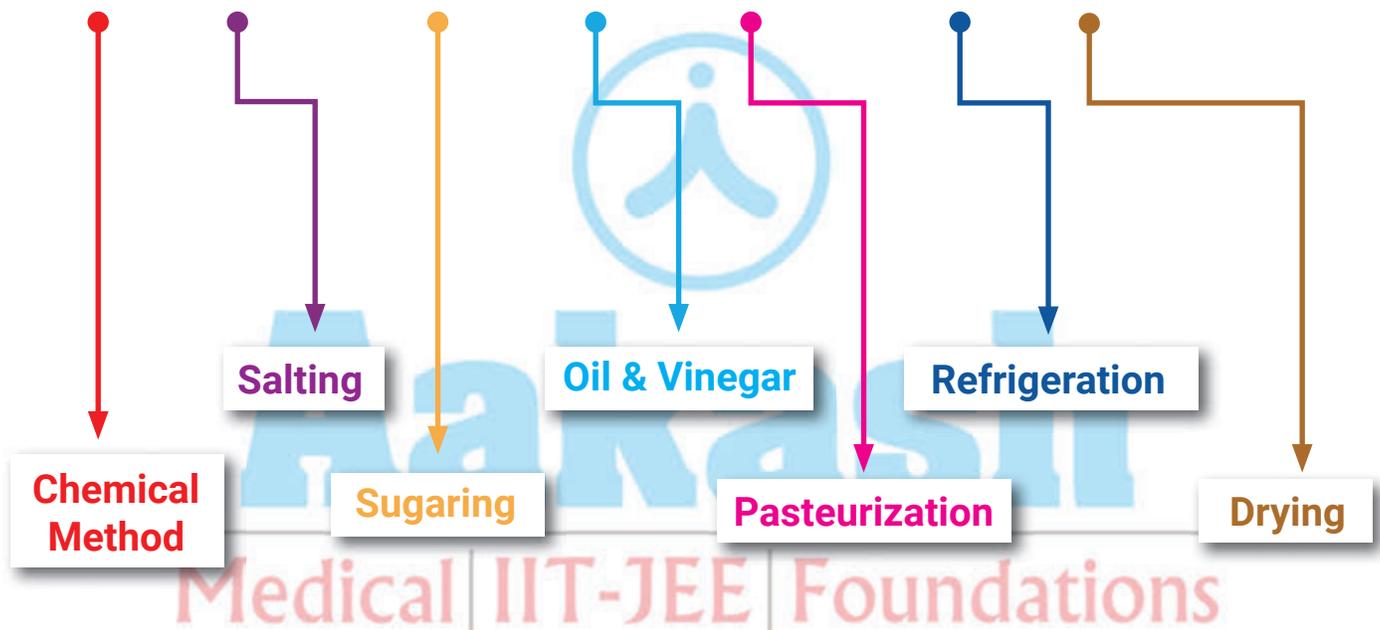
Y	R	S	K	L	Y	E	A	S	T	K	V	S
B	A	C	I	L	L	U	S	U	P	Q	I	H
X	C	V	U	B	N	M	A	Z	O	T	B	L
K	E	U	G	L	E	N	A	S	L	E	R	K
F	G	H	V	J	K	L	P	S	I	T	I	P
R	H	I	Z	O	P	U	S	I	O	A	O	I
H	L	M	A	K	L	J	O	K	K	N	T	U
M	N	P	A	R	A	M	O	E	C	I	U	M
L	E	I	P	J	J	A	L	I	K	S	I	P
G	F	E	R	M	E	N	T	A	T	I	O	N
Q	H	D	E	N	G	K	E	L	G	H	K	H
D	J	C	R	H	I	Z	O	B	I	U	M	F



Mnemonics

Remindful Ruses

Can **S**hilpa **S**ew **O**nly **P**retty **R**ed **D**resses?

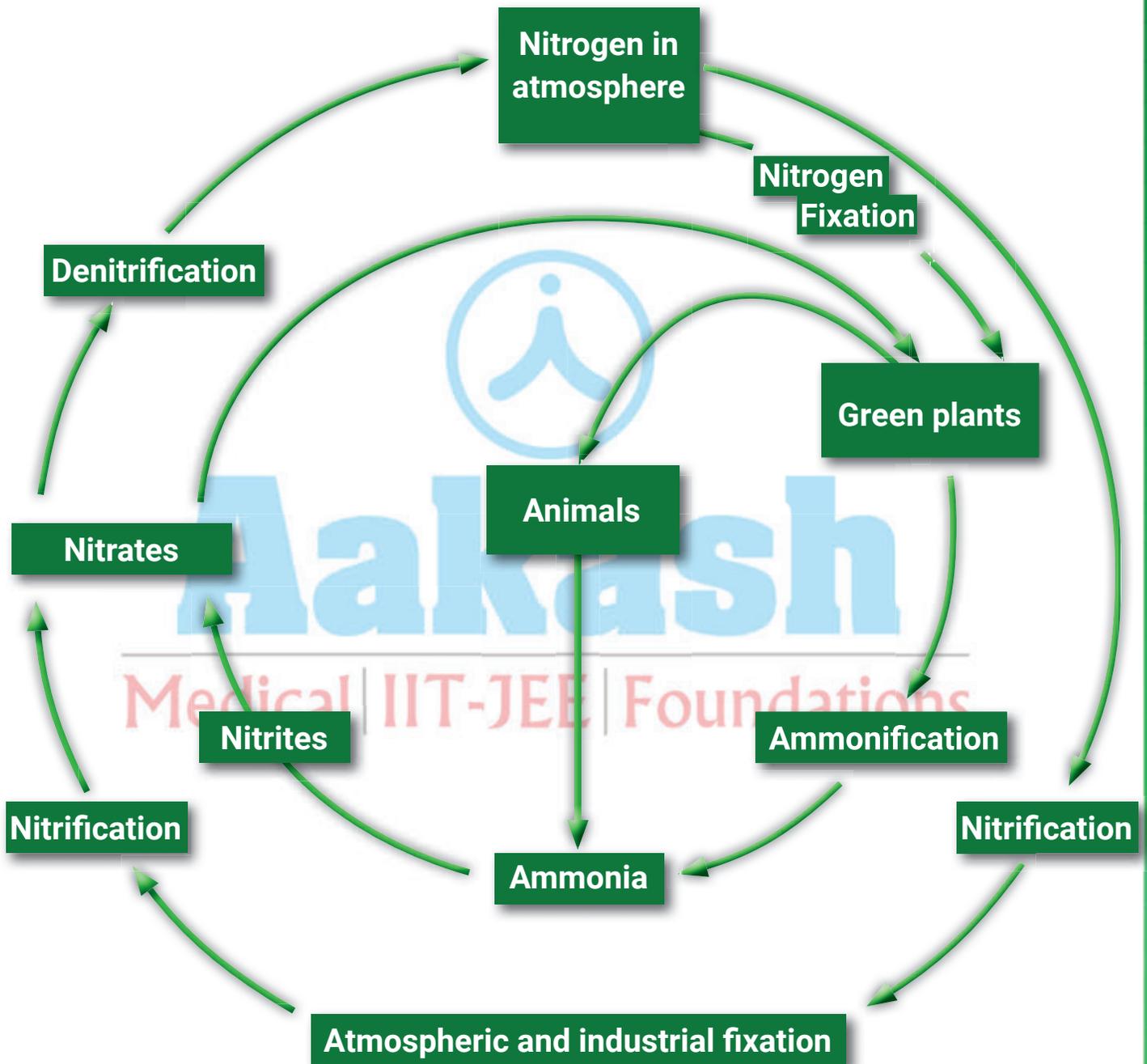


Answer (Match the following)

- 1 → (d)
- 2 → (a)
- 3 → (b)



Answer (Fill in the blanks)



Answer (Puzzle)

Y	R	S	K	L	Y	E	A	S	T	K	V	S
B	A	C	I	L	L	U	S	U	P	Q	I	H
X	C	V	U	B	N	M	A	Z	O	T	B	L
K	E	U	G	L	E	N	A	S	L	E	R	K
F	G	H	V	J	K	L	P	S	I	T	I	P
R	H	I	Z	O	P	U	S	I	O	A	O	I
H	L	M	A	K	L	J	O	K	K	N	T	U
M	N	P	A	R	A	M	O	E	C	I	U	M
L	E	I	P	J	J	A	L	I	K	S	I	P
G	F	E	R	M	E	N	T	A	T	I	O	N
Q	H	D	E	N	G	K	E	L	G	H	K	H
D	J	C	R	H	I	Z	O	B	I	U	M	F



Women, Caste and Reform

Women have been at the centre of discussion for a while. It is because of their position in social, economic and political life.

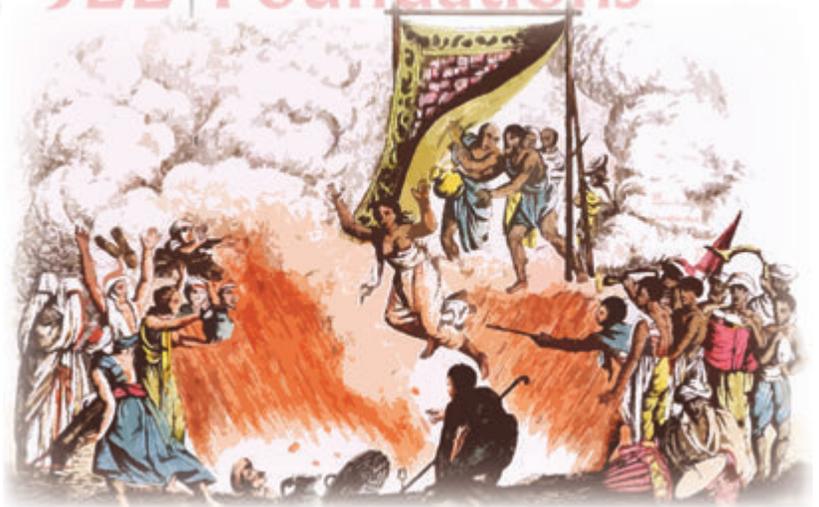
Although the condition of women has improved, there is still a long way to go.

Comparison of the condition of women in ancient time to the present time:

Women in ancient time:

Women during the Vedic period enjoyed equal status with men in all aspects of life.

- They had the right to select their husband through "Swayamvar".
- Women were educated in ancient times.
- Women were the head of the village and held a reputed and dignified position.



- However, this scenario has changed with time.
- We have observed a decline in the position of the women.
- The work has been classified on the basis of gender which means that the household activities has to be done by the women and the outside work has to be done by the men.
- There has been a decline in the social and political status of women.
- Various social evils like Sati, Child marriages etc. crept up in the society.



Condition of women in present times:

At present, although the evil practice like sati does not exist but the society has evolved through a new form of repression like female foeticide, female infanticide, lower sex ratio, less literacy rate for women.

- According to the data published by the Asian Center for Human Rights, an NGO based in New Delhi, India ranks fourth in the world, after Liechtenstein, China and Armenia, in terms of skewed sex ratios at birth.
- In many parts, Indian parents prefer to have sons and find ways to have the girl child aborted before she is born.
- The proportion of women in the highly paid and valued jobs is still very small
- This discrimination against girls at birth also leads to multiple problems like less literacy rate. According to the 2011 census, the female literacy rate is 65.46% as compared to the men's literacy rate which is 82.14%.



- In almost all areas of work, from sports and cinema to factories and fields, women are paid less than men, even when both do exactly the same work. This is there despite the Equal Remuneration Act, 1976.
- The participation of women in the highest decision-making office that is the Parliament is also very less. In the 17th Lok Sabha election, just 78 women were elected out of 543 seats.

Way Forward:

- Increase the role of Self Help Groups in socio-economic empowerment of women.
- Reduce the cases of female foeticide, female infanticide, child marriage by strict implementation of the laws.
- Increase the participation of women in Parliament to at least 33% by providing them reservation.
- More employment opportunities for women in rural as well as urban areas.
- Focus on health and sanitation measures for women on regular basis in rural as well as urban areas.
- Increase the awareness at the rural and urban levels about the discrimination against women.



Quiz Time

1 How many women members got elected in 17th Lok Sabha election?

- (a) 103 (b) 78
(c) 79 (d) 84

2 According to the 2011 census, what is the male literacy rate in India?

- (a) 68.54% (b) 65.46%
(c) 82.14% (d) 74.04%

3 As per 2011 census, what is the sex ratio in India?

- (a) 943 (b) 934
(c) 963 (d) 1008

4 The Headquarter of UNICEF is at:

- (a) New York (b) London
(c) Paris (d) Berne

5 Consider the following statements:

- (i) Women were the head of the village and held reputed and dignified position.
(ii) Women enjoyed equal status with men in all aspects of life.

Which of the following is incorrect regarding the status of women in ancient time:

- (a) A only (b) B only (c) Both A and B (d) None of these



Answer (Quiz Time)

1 (b) 78

2 (c) 82.14%

3 (a) 943

4 (a) New York

5 (d) None of these



Determiners

Determiners are words that are used before Noun(s) and Noun Phrase(s). It is necessary to use Noun/Noun phrase just after them.

Fill in the Blanks with the most appropriate determiner from the given options.

1 _____ unemployed are often neglected in our country.

- (a) Few
- (b) An
- (c) Most
- (d) The

2 Last year, they visited _____ Lake Mansarovar.

- (a) the
- (b) any
- (c) a
- (d) this

3 There is _____ milk in the pot.

- (a) none
- (b) many
- (c) some
- (d) few

4 There was some problem in _____ left eye.

- (a) a
- (b) an
- (c) the
- (d) her



- 5 _____ water is left in the pond.
- (a) A little (b) The little
(c) Few (d) Most
- 6 Swasti has three winter coats, but _____ of them are new.
- (a) none (b) neither
(c) either (d) one
- 7 There were _____ students who raised doubts after the presentation.
- (a) more (b) most
(c) several (d) neither
- 8 Are there _____ players in the playground?
- (a) no (b) any
(c) many a (d) none
- 9 The factory workers won't end the strike till the management accepts _____ demand of the union.
- (a) each (b) every
(c) all (d) both
- 10 _____ restaurants don't accept cash these days.
- (a) Few (b) No
(c) Some (d) Little

Answer

- 1 (d) 2 (a) 3 (c) 4 (d) 5 (a)
6 (a) 7 (c) 8 (b) 9 (a) 10 (c)



Ranking Test

Quiz Time

- 1 Veer Das ranks 7th from the top and 28th from the bottom in a class. How many students are there in the class?
- (a) 32 (b) 33 (c) 34 (d) 35
- 2 During assembly the students are standing in a line. Salman is 21st in order from both the ends. How many students are there in the line?
- (a) 31 (b) 41 (c) 40 (d) 30
- 3 Hritik is 7 ranks ahead of Aamir in a class of 39. If Aamir's rank is 17th from the last. What is Hritik's rank from start?
- (a) 10th (b) 12th (c) 15th (d) 16th
- 4 Pariniti ranked 17th from the top and 28th from the bottom among those who made it to the final round of Miss India Contest. 7 girls did not participate in the competition and 7 failed in the previous round. How many girls enrolled in the contest?
- (a) 55 (b) 56 (c) 57 (d) 58



- 5 Raji is 5 ranks ahead of Raj in a class of 46 students. If Raj's rank is 12th from the last, what is Raji's rank from the start?
- (a) 29th (b) 31st (c) 28th (d) 30th
- 6 Reshma and Praveena are ranked ninth and thirteenth from the top in a class of 57 students respectively. What will be their respective ranks from the last in the class?
- (a) 48th, 44th (b) 49th, 45th (c) 45th, 49th (d) 47th, 43rd
- 7 Naresh is twenty second from the left end in a row of 47 boys. What is his position from the right end?
- (a) 24th (b) 25th (c) 23rd (d) 26th
- 8 Shakti ranks eleventh from start in a class of 54 students. What is her rank from last?
- (a) 43rd (b) 44th (c) 42nd (d) 40th
- 9 Kanani ranked sixteenth from the top and twenty ninth from the bottom among those who passed an examination. Six boys did not participate in the examination and five failed in it. How many students were there in the class?
- (a) 35 (b) 45 (c) 50 (d) 55
- 10 In a row of girls, Nithya and Suganya occupy ninth place from the right end and tenth place from the left end, respectively. If they interchange their places, then Nithya and Suganya occupy seventeenth place from the right end and eighteenth place from the left end respectively. How many girls are there in the row?
- (a) 22 (b) 25 (c) 26 (d) 28



Answer (Quiz Time)

1 (c) 34

2 (b) 41

3 (d) 16th

4 (d) 58

5 (d) 30th

6 (b) 49th, 45th

7 (d) 26th

8 (b) 44th

9 (d) 55

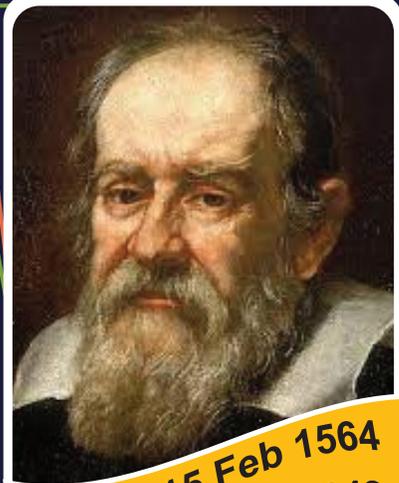
10 (c) 26



FATHER OF OBSERVATIONAL ASTRONOMY

Happy Birthday

Galileo Galilei



Born - 15 Feb 1564
Died - 08 Jan 1642

Galileo Galilei is a famous Italian Astronomer, Mathematics Professor, and Physicist who first used the telescope to study space. His contributions in Science and Mathematics still resonate today, and became the basis for different ideas that sprung up during the scientific revolution during and after his time.



OUR RESULTS 2024

AIR 1

NEET (UG) 2024

State Topper Delhi	State Topper Uttar Pradesh	State Topper West Bengal	State Topper Uttar Pradesh	State Topper Maharashtra	State Topper Rajasthan
Mridul M Anand 3 Year Classroom	Ayush Naugraiya 4 Year Classroom	Arghyadeep Dutta 2 Year Classroom	Aryan Yadav 1 Year Classroom	Palansha Agarwal 2 Year Classroom	Iram Quazi 1 Year Classroom

JEE (Advanced) 2024

AIR 25	AIR 67	AIR 78	AIR 93	AIR 95
Rishi Shekher Shukla 2 Year Classroom	Krishna Sai Shishir 4 Year Classroom	Abhishek Jain 4 Year Classroom	Hardik Aggarwal 2 Year Classroom	Ujjwal Singh 4 Year Classroom

1430 Students Scored Above MAS

344

Classroom Students
Qualified in
NSEs* 2023-24

(Group A & B)
34+30
NSEA*

156
NSEB*

72
NSEC*

23
NSEP*

29
NSEJS*

Aakashians Qualified for INO-2024



Diptanshu Sharma
NSEB | NSEC | NSEP



Priyanshu Sarkar
NSEB | NSEC | NSEP



Mridul Garg
NSEB | NSEC | NSEP



Zaman Hussain
NSEA | NSEC | NSEP



Shubhradeep Paul
NSEA | NSEC | NSEP



Samvit Shandilya
NSEA | NSEC | NSEP

and many more...

*NSEA-National Standard Examination in Astronomy | NSEB-National Standard Examination in Biology | NSEC-National Standard Examination in Chemistry
NSEP-National Standard Examination in Physics | NSEJS-National Standard Examination in Junior Science | INO-Indian National Olympiad

Aakashians Qualified for OCSC/IMOTC-2024

32

Classroom Students
Qualified
in INOs 2024



Aneesh Shastri
Qualified INAO



Sanvi Jain
Qualified INChO



Mridul M Anand
Qualified INBO



Zaman Hussain
Qualified INMO



Sushant Agarwal
Qualified INJSO



Archit Kumar
Qualified INAO Jr

OCSCs - Orientation cum Selection Camps | IMOTC - International Mathematical Olympiad Training Camp

and many more...

Aakashians Qualified for RMO from Classroom Programs

869

Classroom Students
Qualified
in IOQM 2024



Class VIII Joish Achyuta
2 Year Classroom



Class VIII Pranava NS
3 Year Classroom



Class VIII Bruteshwar Rajguru
3 Year Classroom



Class VIII Hardik Mishra
2 Year Classroom



Class VIII Hardik Dhariwal
2 Year Classroom



Class IX Dhanush Damu
4 Year Classroom

IOQM - Indian Olympiad Qualifier in Mathematics

and many more...

Board Exam Results 2024

Top Performers from Class X



Marks
500
500

Devidyuti K Pisharody
CBSE



Marks
499
500

P Harini
CBSE



Marks
498
500

Jiya Dugar V
CBSE

and many more...

Top Performers from Class XII



Marks
496
500

Ananthan R
CBSE



Marks
495
500

Ansh Agrawal
CBSE



Marks
495
500

Himanshu Agarwal
CBSE

and many more...



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